
APPENDIX F

**HYDROLOGY AND WATER QUALITY
DeWitt Center Stormwater Detention Storage
Study for Watersheds A1-A3**

**DeWitt Center Land Development Building
Stormwater Detention Storage Study for Bell
Road/Rock Creek Watershed**

Stormwater Drainage Analysis

**Placer County Main Jail Housing Unit 4
Stormwater Detention Pond Final Report**

A.R. Associates

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DEWITT CENTER STORMWATER DETENTION STORAGE STUDY FOR WATERSHEDS A1 – A3

July 2003

INTRODUCTION

This study analyzes the effects of creating a permanent detention pond by enlarging the temporary detention pond west of the jail complex and eliminating the existing detention storage that occurs north of the jail at the inlet of the existing 48" CMP culvert that extends under the jail. This permanent detention pond is sized to accommodate all developed and remaining undeveloped land within this watershed. This proposed pond will function in conjunction with the existing detention pond (aka Atwood Road Detention Pond) located south of the jail next to Atwood Road. This pond system will reduce peak flows at Atwood Road for the 2-year, 10-year, 25-year and 100-year design storms to levels below 90% of pre-project as set forth in the Placer County SWMM.

Runoff is currently diverted around the west side of the jail complex into the temporary pond via a culvert and overland release which occurs at the northwest corner of the jail complex. This culvert and overland release will continue to function as part of the permanent pond system. The existing 48" CMP culvert under the jail will remain in use and will drain approximately 8.0 acres north of the jail. This culvert discharges into a swale on the south side of the jail complex that drains into the Atwood Road Detention Pond.

Three earlier related stormwater detention studies were prepared by A.R. Associates as follows:

1. "Dewitt Center Expansion Project Hydrology Study March 1995"
2. "Atwood Road Detention Pond Final Report, July 1996".
3. "Placer County Main Jail Housing Unit 4 Stormwater Detention Pond Final Report, November 2000".

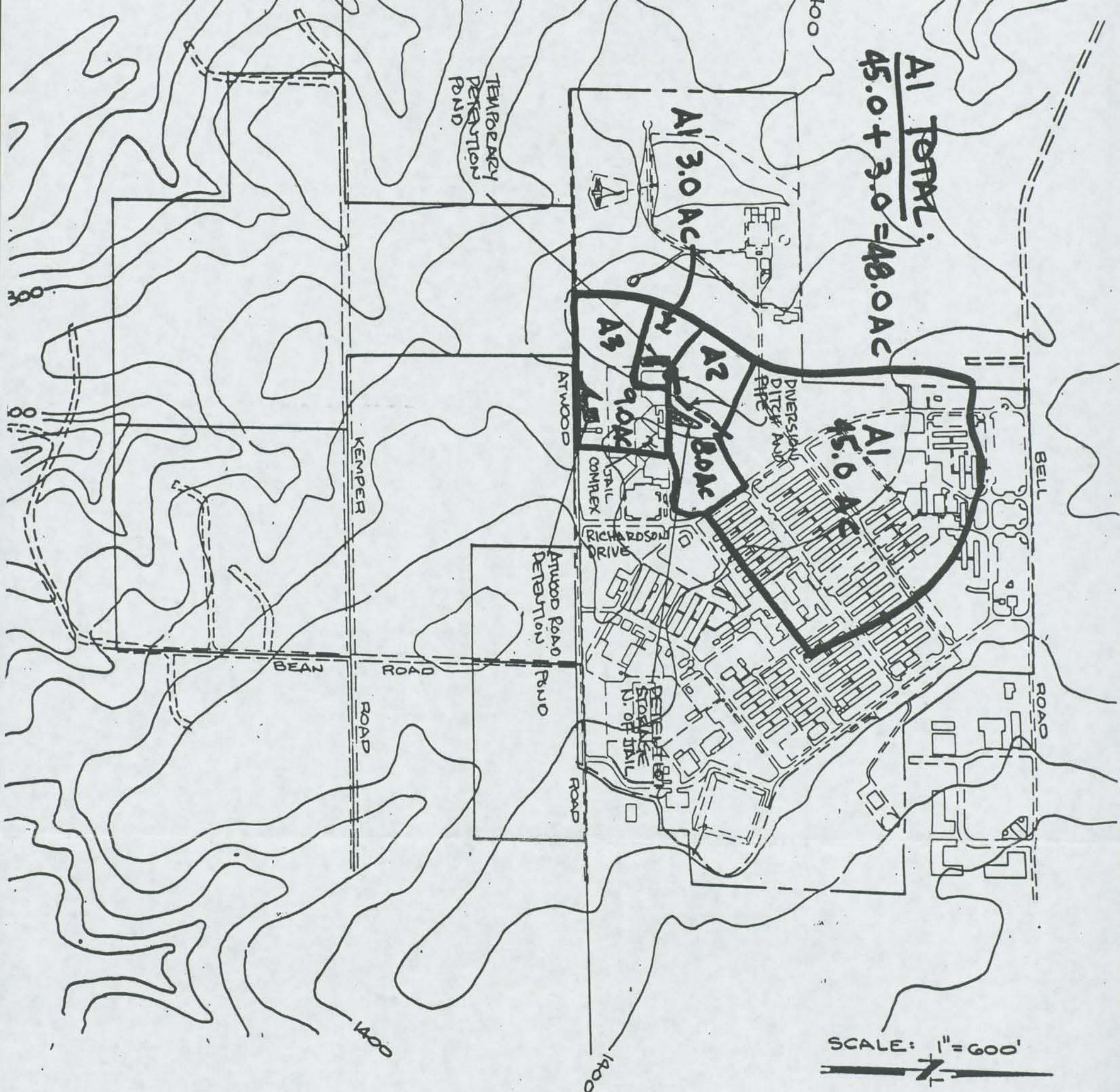
RESULTS

The Army Corps of Engineers HEC-1 computer program was implemented to develop the hydrology and analyze the detention storage system. A three-hour storm was used in this analysis. The permanent pond provides $3.04 \pm$ acre feet of storage for the 100-year design storm. Pre- and post-project watershed maps are attached. The results of the HEC-1 computer runs are as follows:

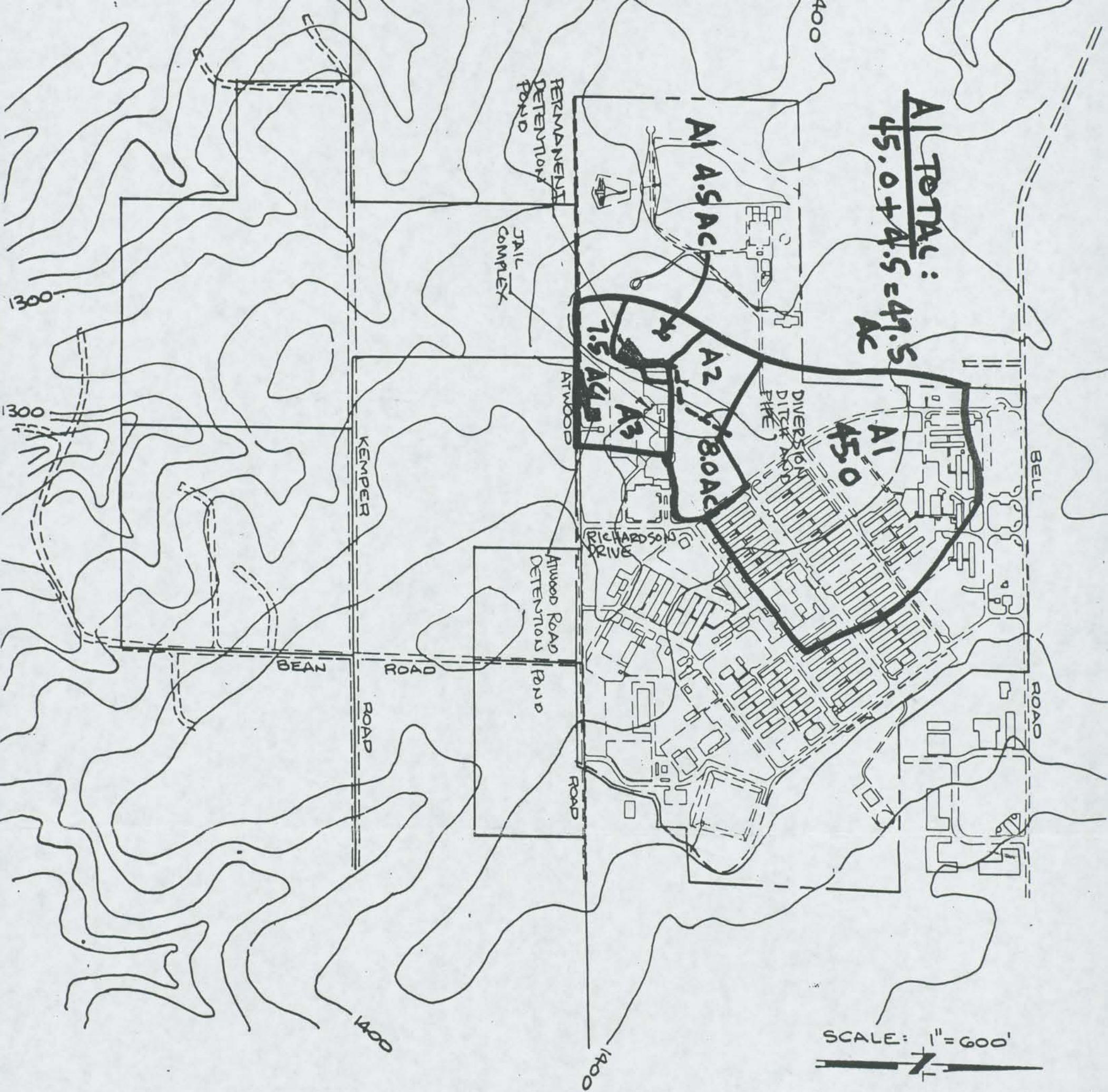
PERMANENT POND

PEAK FLOWS, cfs

| LOCATION | 100-YEAR | | 25-YEAR | | 10-YEAR | | 2-YEAR | | PRE Q100 | POST Q100 | REMARKS |
|----------|----------|-------|---------|-------|---------|-------|--------|-------|-----------|-----------|-------------------------------------|
| | PRE- | POST- | PRE- | POST- | PRE- | POST- | PRE- | POST- | W.S. ELEV | W.S. ELEV | |
| A1 | 129 | 134 | 96 | 101 | 72 | 76 | 35 | 37 | | | |
| RTEA1 | 109 | 79 | 84 | 62 | 67 | 50 | 35 | 25 | | 1396.96 | Detention storage at permanent pond |
| RTA1CH | 108 | 79 | 83 | 62 | 66 | 49 | 34 | 25 | | | |
| A2 | 15 | 23 | 11 | 17 | 8 | 13 | 4 | 7 | | | |
| A3 | 34 | 40 | 25 | 30 | 19 | 22 | 9 | 11 | | | |
| COMB2 | 138 | 105 | 105 | 82 | 83 | 64 | 43 | 32 | | | |
| RTEA3 | 98 | 77 | 53 | 51 | 46 | 43 | 28 | 26 | 1390.98 | 1390.88 | Detention storage at Atwood Road |



**DEWEITT CENTER
 WATERSHEDS A1-A3
 PRE PROJECT
 HEC-1 SHED MAP**



**DEWITT CENTER
WATERSHEDS AI-A3
POST PROJECT
HEC-1 SHED MAP**

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**DEWITT CENTER
LAND DEVELOPMENT BUILDING
STORMWATER DETENTION STORAGE STUDY FOR
BELL ROAD/ROCK CREEK WATERSHED
(SHED B1)
September 2003**

INTRODUCTION

This study analyzes the effects of creating a permanent detention pond on the southeast corner of Bell Road at Richardson Drive. This pond is needed to mitigate increases in peak flows due to construction of the proposed Land Development Building (LDB). Roughly half of the LDB site drains to the south to the jail detention pond that is in the North Ravine watershed. This study analyzes the 5.2 acres that drains northerly into the Rock Creek watershed.

The proposed pond will be two shallow depressions with 3:1 maximum side slopes and a maximum depth of approximately 4 feet. The pond bottoms will be at elevation 1426.0± and the top of berm will be at elevation 1430.0±. The ponds will be interconnected by an 18" drain line. Two ponds are needed to provide clearance for an existing joint utility trench which passes through this area. The pond will provide 0.30 ± acre feet of storage for the 100-year storm. The pond outlet control structure will connect to the existing 18" storm drain pipe system located at the curb return of Bell and Richardson. The outlet control structure will have a 12" outlet pipe that will reduce the post-project peak flows to 90% of pre-project levels.

The Army Corps of Engineers HEC-1 computer program was used in this analysis. A three-hour storm was selected as the design storm. This storm is more than four times the watershed response time of 20.7 minutes for the pre-project conditions. Pre- and post-project watershed maps are attached.

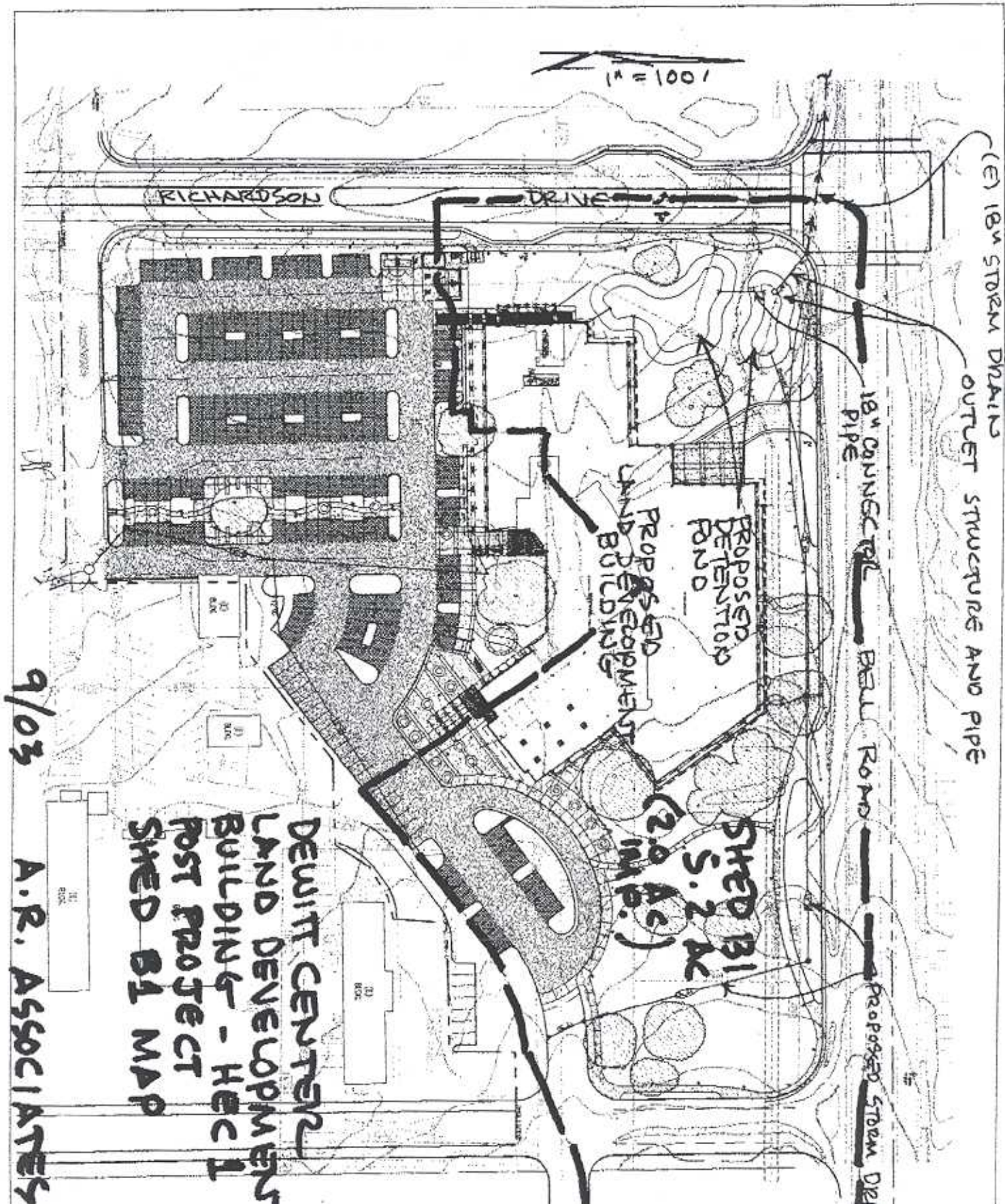
The intent is to landscape the pond so it will be more aesthetically pleasing.

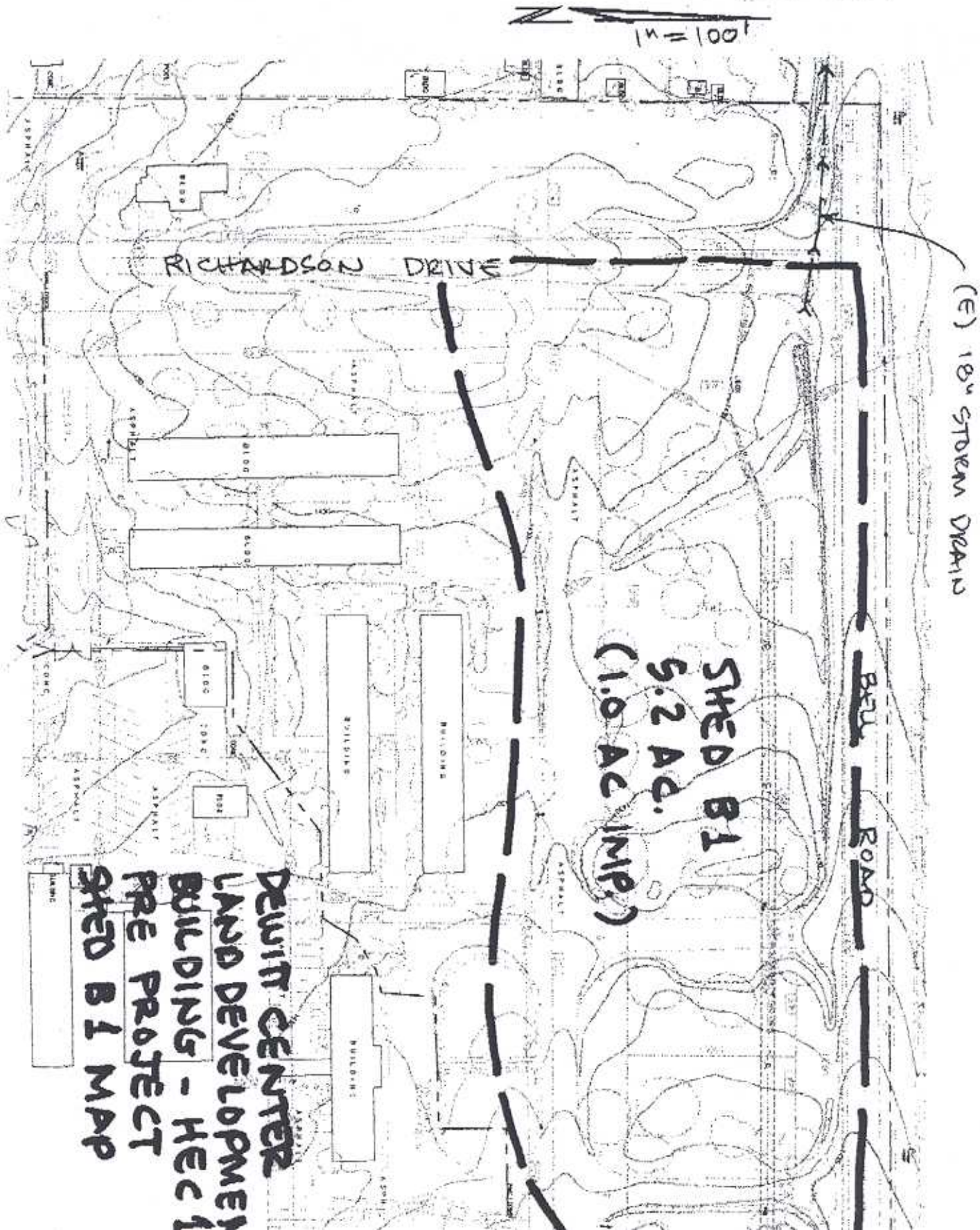
RESULTS

The following table lists the results from the HEC-1 computer runs. A diskette containing the HEC-1 input and output files is attached.

PERMANENT POND**PEAK FLOWS, cfs**

| LOCATION | 100-YEAR | | 25-YEAR | | 10-YEAR | | 2-YEAR | | PRE Q100 | POST Q100 | REMARKS |
|----------|----------|-------|---------|-------|---------|-------|--------|-------|------------|------------|----------------------------------|
| | PRE- | POST- | PRE- | POST- | PRE- | POST- | PRE- | POST- | W.S. ELEV. | W.S. ELEV. | |
| B1 | 11.69 | 8.00 | 8.37 | 5.00 | 6.36 | 4.00 | 3.24 | 2.35 | N/A | 1,428.63 | Detention pond @ Bell/Richardson |





9/03 A.R. ASSOCIATES

PROJECT STORM WATER DETENTION

The Auburn Justice Center is a relocation and consolidation of three departments currently located at DeWitt Center. The project will consist of new buildings and parking to replace or relocate those currently in use. The project is located in the quadrant bounded by Richardson Drive, B Avenue, the existing Main Jail and Juvenile Detention Center. There is also an area on the north side of B Avenue which will contain a parking lot with some covered vehicle storage, and a central hvac plant for the project.

The current access road which extends C Avenue will continue to be used as will the connection to the driveway in front of the JDC. A new driveway on B Avenue will be added near the main entrance to the building for visitor parking.

The area of the project is entirely within the drainage area identified as A1 in previous drainage studies completed for the Main Jail House 4, Juvenile Detention Center, as well as earlier general DeWitt Studies. The most current H4 report is attached for reference. As part of the expansion of the H4 Jail project a detention pond was created since the existing pond located at Atwood Road was not expandable as initially thought. The new detention pond is located approximately 40 feet west of the Jail Housing Unit 3.

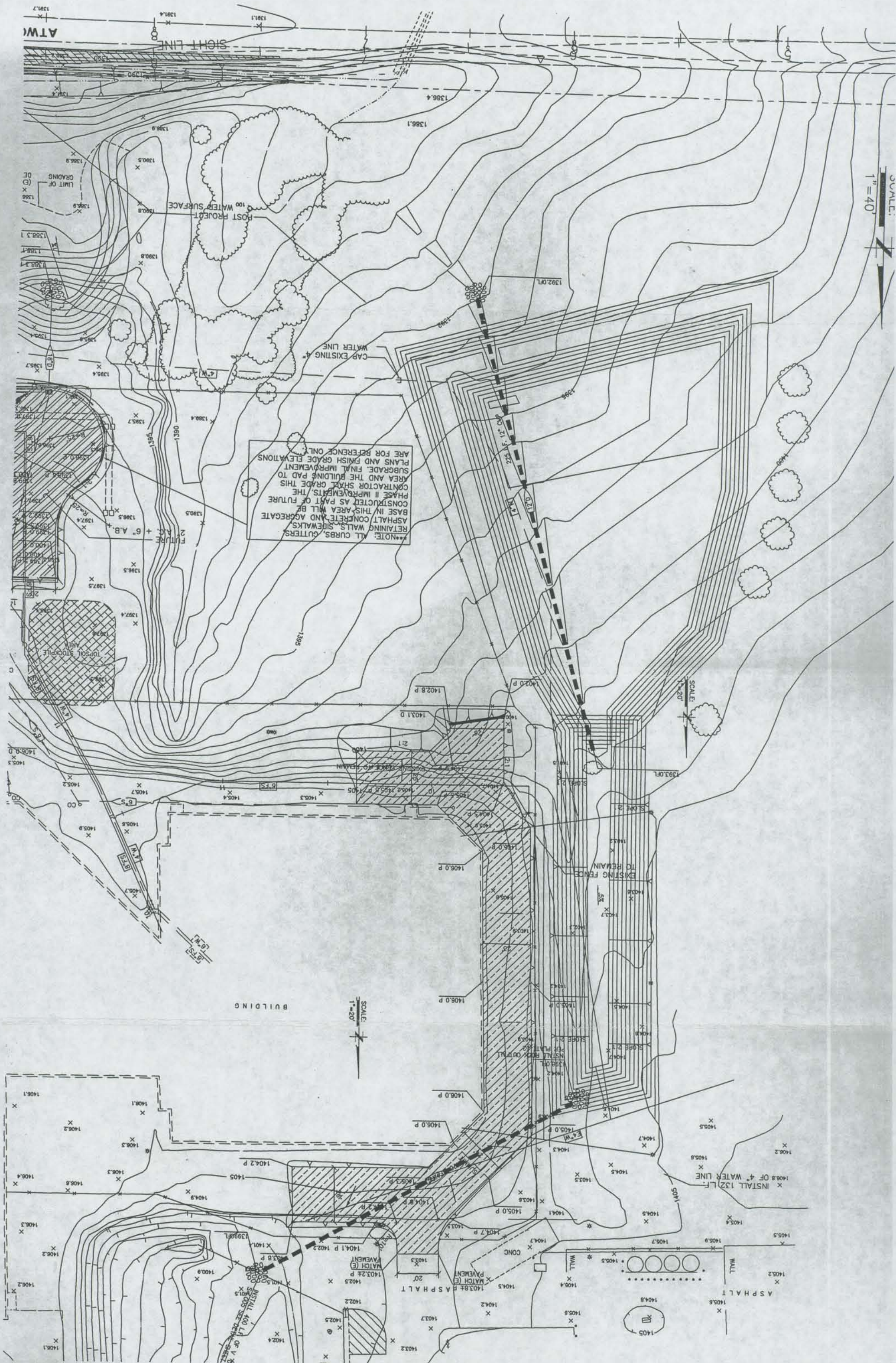
The temporary stormwater detention pond is located to allow expansion as needed for any future development at DeWitt within the A1 watershed. The calculations for drainage flow were based on the existing conditions (predevelopment flows) as the time of House 4 design which was November 2000. The permanent pond was calculated based on Q2, Q10, Q25, and Q100-Year pre- and post-development flows. These flows included predevelopment of the jail and well as DeWitt in general and post-development flow including the addition of House 4. This area of A1 was approximately 47 acres.

Predevelopment flow for DeWitt shed A1 is in the range of 132 cfs and post development of House 4 at 138 cfs for Q100-year. The existing detention post is sized at approximately 30,000 cubic feet or 225,000 gals. The pond is fed by a 42" CMP pipe from the north side of Housing Unit 3 directing water around the west side of the jail complex. The outlet pipe is currently a 12" SDR PVC pipe which directs water to the Atwood Road cross culverts and the existing permanent pond south of the jail.

Enlargement of the temporary pond will incorporate both the Auburn Justice Center and the Land Development Building. The site for the AJC is entirely undeveloped and almost entirely pervious dirt with minor grasses covering about ½ of the site. This condition is used in the predevelopment flows (138 cfs) for the A1 shed area. Post-development flows are effecting 7 acres of this shed. Approximately 3 cfs will be increased to 15 cfs yielding 153 cfs for the Q100-Year.

Enlargement of the temporary pond for the LDB is smaller since 60 percent of this site is currently developed in impervious surface. This area will increase to 70 percent. The area of the LBD within the A1 shed is 6 acres. This is approximately 17 cfs of the 138 cfs predevelopment flow. The addition of impervious surface of 10% will generate an increase of 3 cfs for Q100. This will have the net effect of 156 cfs for pond enlargement.

The pond will be enlarged to the south and southwest to the area presently defined by the berm/dam created with the temporary pond. This will increase the size of the pond from 30000 cubic feet to approximately 110,000 cubic feet. The volume will increase from 225,000 gallons to 850,000 gallons to accommodate the Q100 flows. The existing 12" outlet pipe will be shortened as the pond is enlarged and a new outlet structure will be designed to adequately control the flows for Q2, Q10, and A25 as well as Q100, to predevelopment flows. In addition the outlet structure will be designed to control the flow at Atwood Road at the low point in the road where the overtopping remains no higher than presently at elevation 1391.



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PLACER COUNTY MAIN JAIL HOUSING UNIT 4 STORMWATER DETENTION POND FINAL REPORT November 2000



INTRODUCTION

Housing Unit 4 is an expansion of the existing Placer County Main Jail located at Dewitt Center in Auburn, California. Unit 4, along with associated parking and utilities, will be constructed in the area of the existing walled exercise yard along the south side of the jail complex. A new driveway will be constructed from Atwood Road to serve the Unit 4 site. An existing detention pond, known as the Atwood Road Detention Pond, which is located adjacent to Atwood Road and west of the proposed driveway, was constructed in 1996 to accommodate increases in runoff from the recently constructed finance center and a portion of the juvenile detention center facilities. This detention pond is now considered to be a wetlands. The Jail Housing Unit 4, Phase I, site improvement plans approved on August 28, 2000, showed this pond to be expanded to accommodate increases in runoff due to construction of the Housing Unit 4. It was determined that the Atwood Road detention pond was considered a wetlands after Housing Unit 4 plan approval and construction was under way. County staff opted to find another location for on-site detention storage for Housing Unit 4 that would not involve wetlands. The chosen pond site is located approximately 40 feet west of the existing jail complex next to Housing Unit 3. This report addresses this new stormwater detention pond.

Two earlier related stormwater detention studies were prepared by A.R. Associates as follows:

1. "Dewitt Center Expansion Project Hydrology Study March 1995". (This study was incorporated into the Dewitt Center Expansion EIR). This report identifies potential on-site stormwater detention storage areas that can be utilized to mitigate increases in runoff caused by new Dewitt Center construction.
2. "Atwood Road Detention Pond Final Report, July 1996". The intent of this pond is described in the introduction to this report.

TEMPORARY STORMWATER DETENTION POND

As previously stated, this pond will be constructed approximately 40 feet west of the existing jail complex next to Housing Unit 3. This pond is considered to be temporary and it is sized to account for increases in runoff from Housing Unit 4 only. In the future, it will be enlarged to accommodate ultimate watershed development. The soil from the temporary pond excavation will be used to construct the berm for the permanent detention pond which will

incorporate the temporary pond. When future Dewitt Center properties located in this watershed are developed, increases in runoff can be accommodated in the permanent pond. The temporary and permanent ponds will function by diverting runoff around the northwest corner of the jail complex through a new 42-inch pipe. A temporary ditch will be constructed from the end of the existing 30-inch storm drain, which is located approximately 350 feet north of the main jail complex, to the new 42-inch pipe inlet which will be located near the northwest corner of the main jail complex. This ditch will be replaced with a pipe as the area north of the jail complex is developed. This temporary ditch and new 42-inch pipe will carry runoff from approximately 47 acres identified as Shed A1 on the attached temporary pond shed map. As identified on the temporary pond shed map, a 3.0-acre portion of Shed A1 will drain directly into the temporary pond. Currently, Shed A1 drains to an existing 48-inch culvert which passes under the jail complex. This 48-inch culvert will continue to carry runoff from approximately 8 acres identified as Shed A2 on the temporary pond shed map.

PERMANENT STORMWATER DETENTION POND

As described above, the pond berm will be constructed as part of the temporary pond construction. As future watershed development occurs, the area behind the term will be excavated to create volume to accommodate increases in runoff from the A1 watershed. This pond will have adequate capacity for the ultimate development of A1 watershed.

The detention storage that occurs at the 48-inch culvert inlet (described above) will be eliminated when the area north of the jail develops.

The permanent pond will function as described above under "Temporary Stormwater Detention Pond".

As identified on the Shed Map, a 4.5-acre portion of Shed A1 will drain directly into the permanent detention pond.

RESULTS

The Army Corps of Engineers HEC-1 computer program was implemented to determine Q_{10} and Q_{100} peak flow calculations and ponded water surface elevations. A three-hour storm was used for all computer runs.

As described in the earlier studies, overtopping of Atwood Road begins at elevation 1390.7. The Q_{100} water surface elevations at Atwood Road will be 1390.95, 1390.98 and 1391.01

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Stormwater Detention Pond
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for the temporary and permanent pond and pre-project, respectively.

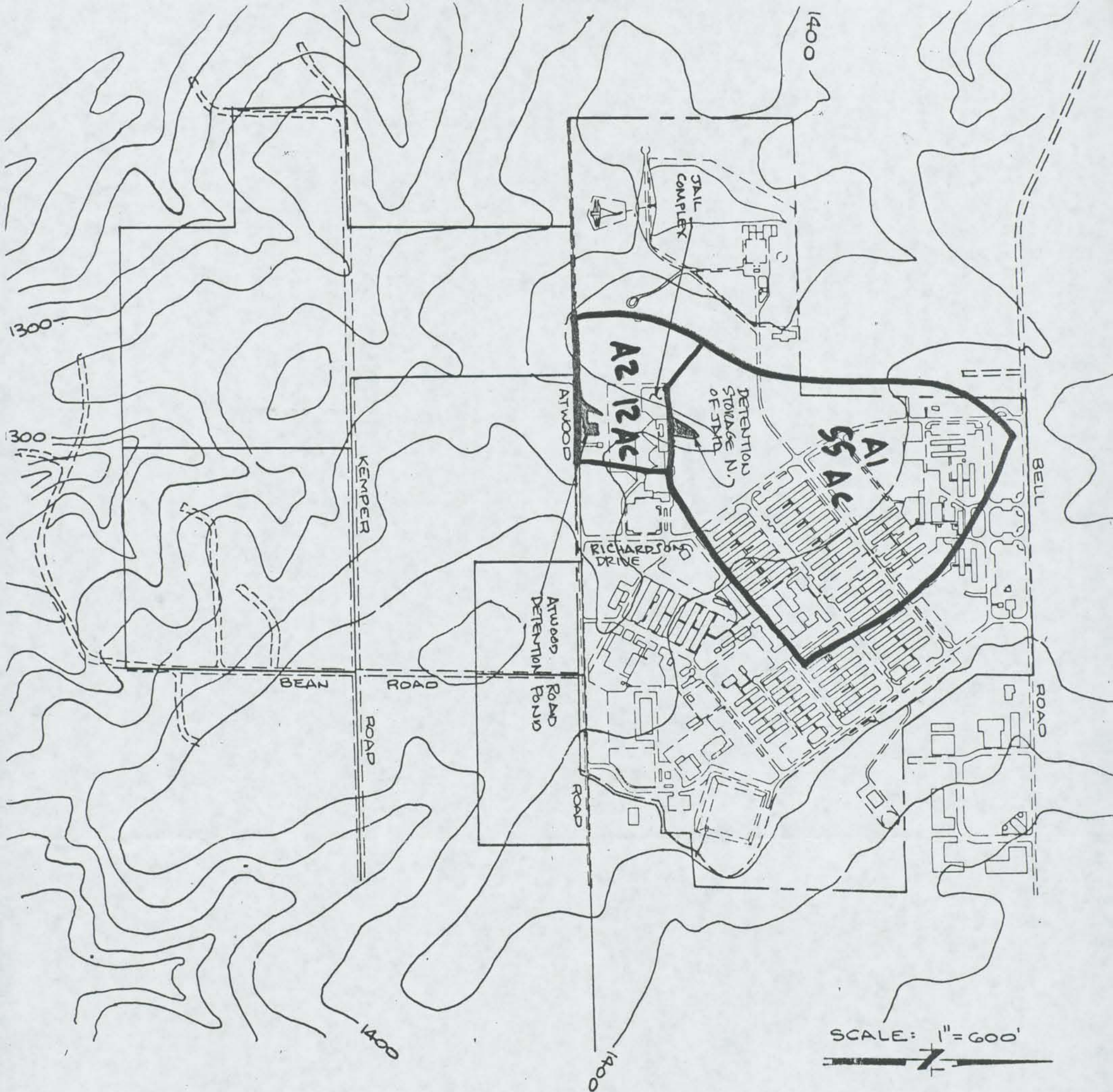
The results of the HEC-1 computer runs are as follows:

**PEAK FLOWS, cfs
TEMPORARY POND**

| LOCATION | 100-YEAR | | 25-YEAR | | 10-YEAR | | 2-YEAR | | PRE-Q100 | POST-Q100 | REMARKS |
|----------|----------|-------|---------|-------|---------|-------|--------|-------|-----------|-----------|---|
| | PRE- | POST- | PRE- | POST- | PRE- | POST- | PRE- | POST- | W.S. ELEV | W.S. ELEV | |
| A1 | | 129 | | 96 | | 72 | | 35 | | | |
| RTEA1 | | 109 | | 84 | | 67 | | 35 | ---- | 1399.95 | Detention storage at temporary pond |
| RTA1CH | | 108 | | 83 | | 66 | | 34 | | | |
| A2 | | 15 | | 11 | | 8 | | 4 | | | |
| RTEA2 | | 15 | | 11 | | 8 | | 4 | 1400.39 | 1396.35 | Detention storage north of jail complex |
| A3 | | 34 | | 25 | | 19 | | 9 | | | |
| COMB2 | | 138 | | 105 | | 83 | | 43 | | | |
| RTEA3 | 105 | 96 | 54 | 53 | 46 | 46 | 29 | 28 | 1391.01 | 1390.98 | Detention storage at Atwood Road detention pond |

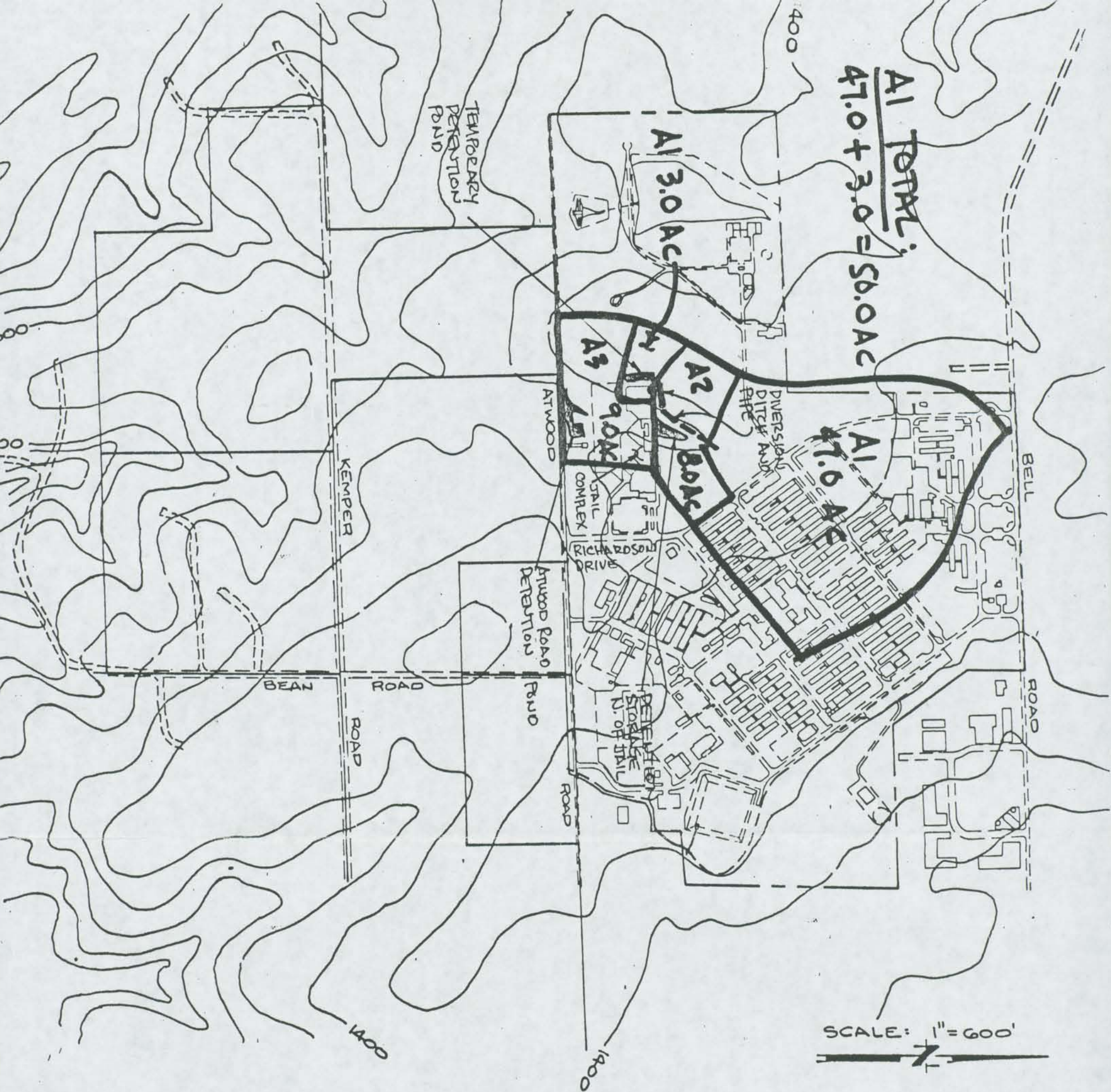
PERMANENT POND

| LOCATION | 100-YEAR | | 25-YEAR | | 10-YEAR | | 2-YEAR | | POST-Q100 | POST-Q100 | REMARKS |
|----------|----------|-------|---------|-------|---------|-------|--------|-------|-----------|-----------|-------------------------------------|
| | PRE- | POST- | PRE- | POST- | PRE- | POST- | PRE- | POST- | W.S. ELEV | W.S. ELEV | |
| A1 | | 136 | | 102 | | 77 | | 37 | | | |
| RTEA1 | | 90 | | 71 | | 58 | | 31 | | 1396.53 | Detention storage at permanent pond |
| RTA1CH | | 90 | | 71 | | 58 | | 31 | | | |
| A2 | | 15 | | 11 | | 8 | | 4 | | | |
| A3 | | 32 | | 23 | | 17 | | 8 | | | |
| COMB2 | | 115 | | 90 | | 73 | | 38 | | | |
| RTEA3 | 105 | 92 | 54 | 53 | 46 | 46 | 29 | 28 | 1391.01 | 1390.45 | Detention storage at permanent pond |



PLACER COUNTY JAIL
HOUSING UNIT 4
PREPROJECT SITE MAP

A1 TOTAL:
47.0 + 3.0 = 50.0 AC



SCALE: 1" = 600'

PLACER COUNTY JAIL
HOUSING UNIT 4
TEMPORARY POND
SITE MAP

